

## Conversion Challenge

Write the correct abbreviation for each metric unit.

1) Kilogram Kg4) Milliliter mL7) Kilometer Km2) Meter m5) Millimeter mm8) Centimeter cm3) Gram g6) Liter L9) Milligram mg

Try these conversions, using the ladder method.

1) 2000 mg = 2 g6) 5 L = 5000 mL11) 16 cm = 160 mm2) 104 km = 104000 m7) 198 g = 0.198 kg12) 2500 m = 2.5 km3) 480 cm = 4.8 m8) 75 mL = 0.075 L13) 65 g = 65000 mg4) 5.6 kg = 5600 g9) 50 cm = 0.5 m14) 6.3 cm = 63 mm5) 8 mm = 0.8 cm10) 5.6 m = 560 cm15) 120 mg = 0.120 g

Compare using &lt;, &gt;, or =.

16) 63 cm < 6 m17) 5 g > 508 mg18) 1.500 mL = 1.5 L19) 536 cm = 53.6 dm20) 43 mg < 5 g21) 3.6 m > 36 cm

# Scientific Notation

Name: \_\_\_\_\_ Date: \_\_\_\_\_



Convert each number from scientific notation to real.

(1)  $4.427 \times 10^{-1} = 0.4427$

(6)  $1.883 \times 10^{-6} = 0.000001883$

(2)  $9.952 \times 10^6 = 9952000$

(7)  $3.412 \times 10^2 = 341.2$

(3)  $3.858 \times 10^{-3} = 0.003858$

(8)  $9.748 \times 10^3 = 9748$

(4)  $3.673 \times 10^4 = 36730$

(9)  $4.297 \times 10^{-4} = 0.0004297$

(5)  $5.862 \times 10^{-5} = 0.00005862$

(10)  $7.437 \times 10^2 = 743.7$



Convert each number from real to scientific notation.

(11) 0.002397  $2.397 \times 10^{-3}$

(16) 5,167  $5.167 \times 10^3$

(12) 93.29  $9.329 \times 10^1$

(17) 0.0005511  $5.511 \times 10^{-4}$

(13) 6,139  $6.139 \times 10^3$

(18) 0.009578  $9.578 \times 10^{-3}$

(14) 1.772  $1.772 \times 10^0$

(19) 0.00006144  $6.144 \times 10^{-5}$

(15) 73.12  $7.312 \times 10^1$

(20) 0.03592  $3.592 \times 10^{-2}$

Student Name: \_\_\_\_\_

Score: \_\_\_\_\_

## Adding and Subtracting Numbers in Scientific Notation

Example:  $3 \times 10^4 + 2.5 \times 10^5$ 

$$\begin{aligned} &3 \times 10^4 + 2.5 \times 10^5 \\ &= 0.3 \times 10^5 + 2.5 \times 10^5 \\ &= (0.3 + 2.5) \times 10^5 \\ &= 2.8 \times 10^5 \end{aligned}$$

Answer:  $2.8 \times 10^5$  $2.5 \times 10^4 - 1.5 \times 10^3$ 

$$\begin{aligned} &2.5 \times 10^4 - 0.15 \times 10^4 \\ &\boxed{2.35 \times 10^4} \end{aligned}$$

Answer:

 $1.43 \times 10^2 + 7.105 \times 10^5$ 

$$\begin{aligned} &1.43 \times 10^2 \\ &0.00143 \times 10^5 + 7.105 \times 10^5 \\ &\boxed{7.10643 \times 10^5} \end{aligned}$$

Answer:

 $1.2 \times 10^2 - 6 \times 10^3$ 

$$\begin{aligned} &0.12 \times 10^3 - 6 \times 10^3 \\ &\boxed{-5.88 \times 10^3} \end{aligned}$$

Answer:

 $7.1567 \times 10^3 + 5.5 \times 10^6$ 

$$0.0071567 \times 10^6 + 5.5 \times 10^6$$

$$\boxed{5.5071567 \times 10^6}$$

Answer:

 $9.65 \times 10^7 - 8.1 \times 10^6$ 

$$9.65 \times 10^7 - 0.81 \times 10^7$$

$$\boxed{8.84 \times 10^7}$$

Answer:

Student Name: \_\_\_\_\_

Score: \_\_\_\_\_

**Multiplying Numbers in Scientific Notation***Example:*  $(4.1 \times 10^2)(9.5 \times 10^3)$ 

$$\begin{aligned}(4.1 \times 10^2)(9.5 \times 10^3) \\&= (4.1 \times 9.5) \times (10^2 \times 10^3) \\&= 38.95 \times 10^{2+3} \\&= 38.95 \times 10^5 \\&= 3.895 \times 10^6\end{aligned}$$

Answer:  $3.895 \times 10^6$  $(6 \times 10^4)(8 \times 10^5)$ 

$$\begin{aligned}48 \times 10^9 \\ \boxed{4.8 \times 10^{10}}\end{aligned}$$

Answer: \_\_\_\_\_

 $(1.4 \times 10^3)(5.2 \times 10^4)$ 

$$\boxed{7.28 \times 10^7}$$

Answer: \_\_\_\_\_

 $(8.102 \times 10^6)(1.3 \times 10^1)$ 

$$\begin{aligned}10.5326 \times 10^7 \\ \boxed{1.05326 \times 10^8}\end{aligned}$$

Answer: \_\_\_\_\_

 $(7.538 \times 10^0)(1.952 \times 10^7)$ 

$$\begin{aligned}14.714176 \times 10^7 \\ \boxed{1.4714176 \times 10^8}\end{aligned}$$

Answer: \_\_\_\_\_

 $(5.21 \times 10^4)(9.5 \times 10^5)$ 

$$\begin{aligned}49.495 \times 10^{10} \\ \boxed{4.9495 \times 10^{11}}\end{aligned}$$

Answer: \_\_\_\_\_

Student Name: \_\_\_\_\_

Score: \_\_\_\_\_

**Dividing Numbers in Scientific Notation***Example:*  $(6.27 \times 10^5) \div (1.9 \times 10^3)$ 

$$\begin{aligned} & (6.27 \times 10^5) \div (1.9 \times 10^3) \\ &= (6.27 \div 1.9) \times (10^5 \div 10^3) \\ &= 3.3 \times 10^{5-3} \\ &= 3.3 \times 10^2 \end{aligned}$$

Answer:  $3.3 \times 10^2$  $(5 \times 10^4) \div (2.5 \times 10^2)$ 

$$2 \times 10^2$$

Answer:

 $(2.4 \times 10^7) \div (3.5 \times 10^9)$ 

$$\begin{aligned} & 0.6857... \times 10^{-2} \\ & \boxed{6.857 \times 10^{-3}} \end{aligned}$$

Answer:

 $(7.43 \times 10^4) \div (2.1 \times 10^4)$ 

$$3.53809... \times 10^0$$

Answer:

 $(7.1 \times 10^4) \div (8.2 \times 10^{11})$ 

$$\begin{aligned} & 0.86585... \times 10^{-7} \\ & \boxed{8.6585 \times 10^{-8}} \end{aligned}$$

Answer:

 $(8.306 \times 10^{11}) \div (9.54 \times 10^8)$ 

$$\begin{aligned} & 0.87064... \times 10^3 \\ & \boxed{8.7064 \times 10^2} \end{aligned}$$

Answer:

# U. S. - Metric Conversions

## Length

1 in = 2.54 cm
1 ft = 30.5 cm
1 yd = 91.4 cm
1 mi = 1610 m
1 mi = 1.61 km
0.0394 in = 1 mm
0.394 in = 1 cm
39.4 in = 1 m
3.28 ft = 1 m
1.09 yd = 1 m
0.621 mi = 1 km

## Weight

1 oz = 28.3 g
1 lb = 454 g
1 lb = 0.454 kg
0.0353 oz = 1 g
0.00220 lb = 1 g
2.20 lb = 1 kg

## Capacity

1 gal = 3.79 L
1 qt = 0.946 L
0.264 gal = 1 L
1.06 qt = 1 L

1. 2500 m = 2.5 km

$$2500m \left( \frac{1km}{1000m} \right) = 2.5 km$$

2. 3.54 m = 354 cm

$$3.54m \left( \frac{100cm}{1m} \right) = 354 cm$$

3. 1,234,560 cm = 12.34560 km

$$1234560cm \left( \frac{1m}{100cm} \right) \left( \frac{1km}{1000m} \right)$$

4. 30,000 kg =  $3.0 \times 10^7$  g

$$30,000kg \left( \frac{1000g}{1kg} \right) = 30,000,000 g$$

5. 48 oz = 2.98848 lb

$$48oz \left( \frac{28.3g}{1oz} \right) \left( \frac{0.00220lb}{1g} \right) =$$

6. 2.4 mi = 12673.92 ft

$$2.4mi \left( \frac{1610m}{1mi} \right) \left( \frac{3.28ft}{1m} \right) = 12673.92 ft$$

7. 420 hr = 2.490 wks (rounded)

$$420hr \left( \frac{1day}{24hr} \right) \left( \frac{1wk}{7day} \right) =$$

8.  $\frac{3}{4}$  hr = 2700 sec

$$\frac{3h}{4} \left( \frac{60min}{1hr} \right) \left( \frac{60sec}{1min} \right) = 2700 s$$

9.  $88 \frac{ft}{sec} =$  59.99  $\frac{mi}{hr}$

$$88ft \left( \frac{1m}{3.28ft} \right) \left( \frac{1mi}{1610m} \right) \left( \frac{60sec}{1min} \right) \left( \frac{60min}{1hr} \right)$$

10.  $45 \frac{mi}{hr} =$  66.01  $\frac{ft}{sec}$

$$45mi \left( \frac{1610m}{1mi} \right) \left( \frac{3.28ft}{1m} \right) \left( \frac{1hr}{60min} \right) \left( \frac{1min}{60sec} \right)$$

13. 17.0 in = 43.18 cm

$$17.0in \left( \frac{2.54cm}{1in} \right) = 43.18 cm$$

14. 1950 g = 4.295 lb

$$1950g \left( \frac{1lb}{454g} \right) = 4.295 lb$$

15. 0.85 qt = 804.1 mL

16. 61 cm = 2.00 ft

$$0.85 \text{ qt} \left( \frac{0.946 \text{ L}}{1 \text{ qt}} \right) \left( \frac{1000 \text{ mL}}{1 \text{ L}} \right) = 61 \text{ cm} \left( \frac{1 \text{ in}}{2.54 \text{ cm}} \right) \left( \frac{1 \text{ ft}}{12 \text{ in}} \right)$$

17. 1.2 kg = 42.4032 oz

18. 2 L = 1.06 pt

$$1.2 \text{ Kg} \left( \frac{1000 \text{ g}}{1 \text{ Kg}} \right) \left( \frac{1 \text{ oz}}{28.35 \text{ g}} \right) = 2 \text{ L} \left( \frac{1.06 \text{ qt}}{1 \text{ L}} \right) \left( \frac{1 \text{ pt}}{2 \text{ qt}} \right) =$$

19. The distance from a Port Huron to the Indiana State line is approximately 271 miles (via I-94). Express this distance in kilometers.

$$271 \text{ mi} \left( \frac{1.61 \text{ Km}}{1 \text{ mi}} \right) = \boxed{436.31 \text{ Km}}$$

20. A baby born in the US weighs 3.295 kg according to the scale in the birthing room. Convert this to pounds and ounces so you can tell the grandparents how much the baby weighed.

$$3.295 \text{ Kg} \left( \frac{2.2 \text{ lbs}}{1 \text{ Kg}} \right) = \boxed{7.249 \text{ lb}}$$

21. A child requires a 5 ml dose of medicine each day. How many days would a gallon of this medicine last?

$$1 \text{ gal} \left( \frac{3.79 \text{ L}}{1 \text{ gal}} \right) \left( \frac{1000 \text{ mL}}{1 \text{ L}} \right) \left( \frac{1 \text{ day}}{5 \text{ mL}} \right) = \boxed{758 \text{ days}}$$

22. The moon is 384,403 km from the earth. Estimate how many quarters laid end to end it would take to reach the moon if a quarter has a diameter of 2.3 cm.

$$384,403 \text{ Km} \left( \frac{1000 \text{ cm}}{1 \text{ km}} \right) \left( \frac{1 \text{ Quarter}}{2.3 \text{ cm}} \right) = \boxed{167,131,739.1 \text{ Quarters}} \\ \text{OR } 1.671317391 \times 10^8$$

23. How many years old are you if you have lived 1 billion seconds?

$$1 \times 10^9 \text{ sec} \left( \frac{1 \text{ min}}{60 \text{ sec}} \right) \left( \frac{1 \text{ hr}}{60 \text{ min}} \right) \left( \frac{1 \text{ day}}{24 \text{ hr}} \right) \left( \frac{1 \text{ yr}}{365 \text{ day}} \right) = \boxed{31.7 \text{ years old}}$$

24. 1 milliliter of ink can print 50 pages of text. If you had 100 gallons of ink then how many pages could you print?

$$100 \text{ gal} \left( \frac{3.79 \text{ L}}{1 \text{ gal}} \right) \left( \frac{1000 \text{ mL}}{1 \text{ L}} \right) \left( \frac{50 \text{ pg}}{1 \text{ mL}} \right) = \boxed{18,950,000 \text{ pages}}$$

25. A clerk can sort 375 sheets per hour. If there are 225 sheets in an inch, how long will it take her to file 125 inches of loose sheets.

$$125 \text{ in} \left( \frac{225 \text{ sheets}}{1 \text{ in}} \right) \left( \frac{1 \text{ hr}}{375 \text{ sheets}} \right) = \boxed{75 \text{ hrs}}$$

## Density Problems

1. The mass of a spoon is 7.5 grams, and its volume is 3.2 ml. What is the density of the toy spoon?

Have	Need	How
$M = 7.5g$ $V = 3.2ml$	Density	$D = \frac{M}{V}$

Solutions:

$$D = \frac{7.5g}{3.2ml} = 2.34375g/ml$$

2. A mechanical pencil has the density of 3 grams per cubic centimeter. The volume of the pencil is 15.8 cubic centimeters. What is the mass of the pencil?

Have	Need	How
$D = 3g/cm^3$ $V = 15.8cm^3$	Mass	$D = \frac{M}{V}$ $M = DV$

Solutions:

$$M = \frac{3g}{cm^3} \times 15.8cm^3 = \boxed{47.4g}$$

3. A screwdriver has the density of 5.5 grams per cubic centimeter. it also has the mass of 2.3 grams. What is the screwdrivers volume?

Have	Need	How
$D = 5.5g/cm^3$ $M = 2.3g$	Volume	$D = \frac{M}{V}$ $V = \frac{M}{D}$

Solution:

$$V = \frac{2.3g}{5.5g/cm^3} = \boxed{0.418cm^3}$$